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(54) Electric Storage Battery

(57) Electric storage batteries 1 are provided with a built-in water-refilling device 4 and, in addition, with a sealable diagnostic aperture 7.

It is thereby possible to gain access to the battery even though the conventional plug hole is obstructed by the components of the water-refilling device.

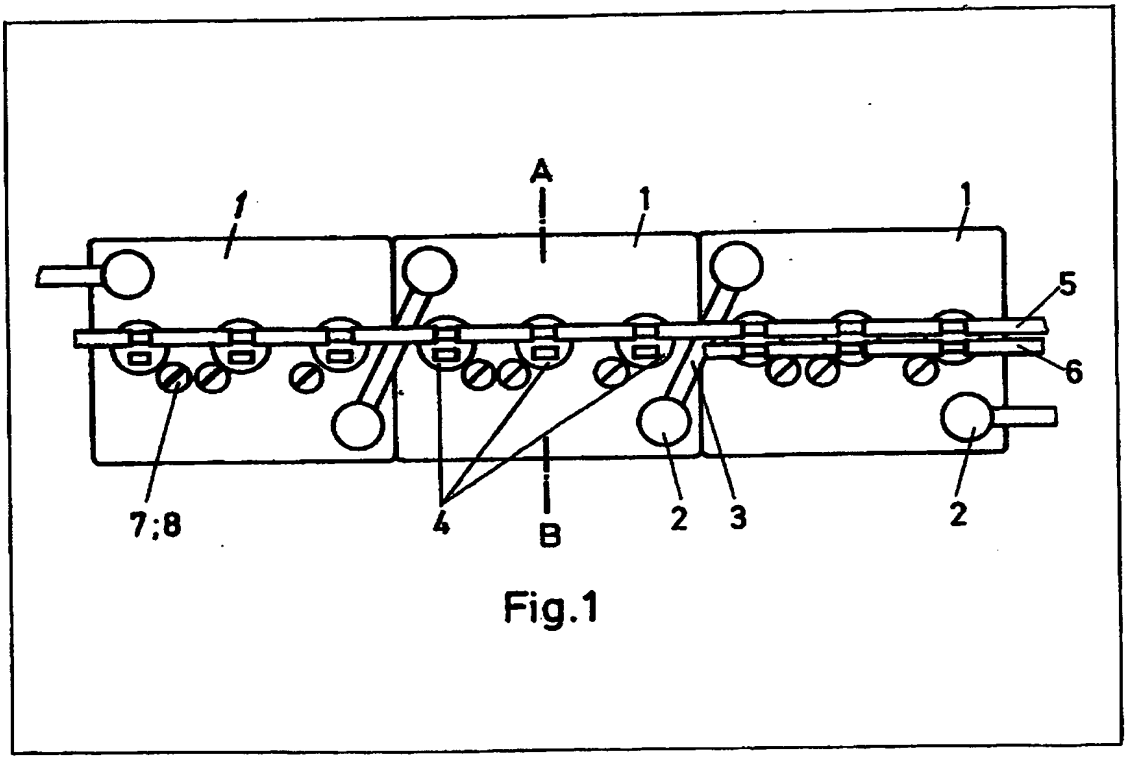

Fig.1

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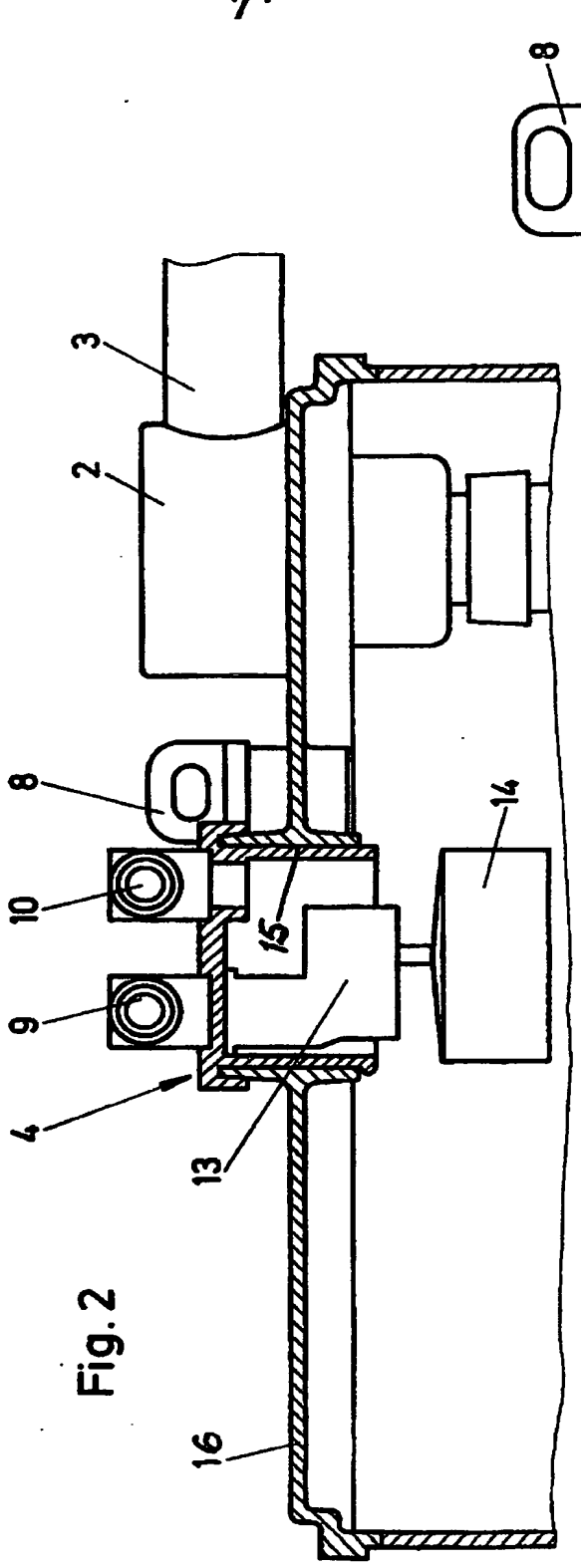

Fig.2

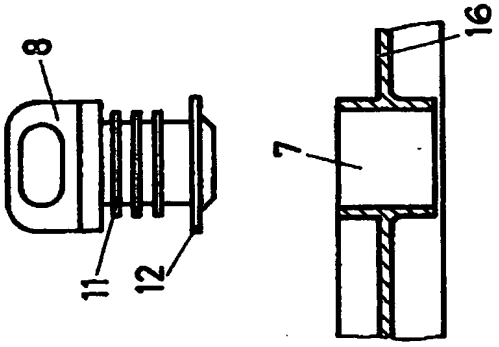

Fig.3

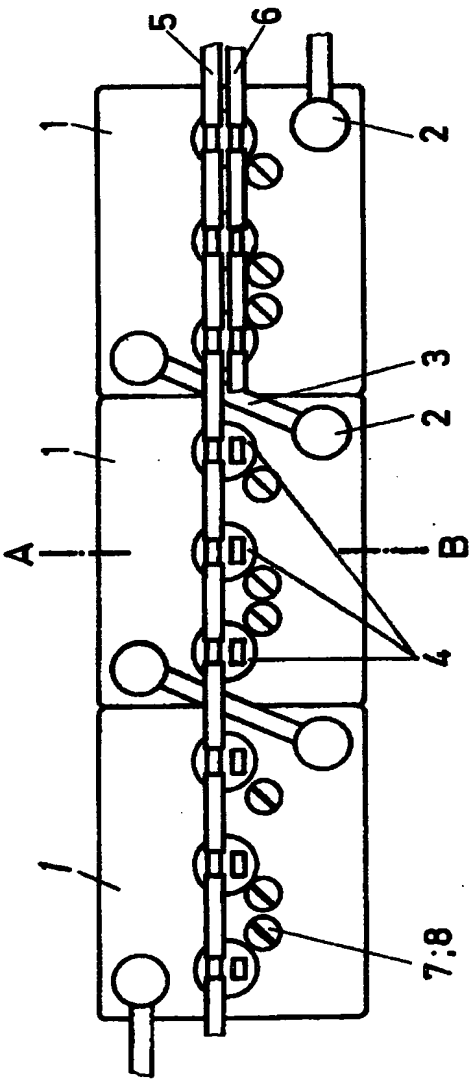

Fig.1

SPECIFICATION

Electrical Storage Battery

TECHNICAL FIELD OF THE INVENTION

The invention relates to an electric storage battery in which a built-in water-refilling device is provided in the conventional plug hole of the container cover.

BACKGROUND ART

Such water-refilling devices are used particularly in the charging of traction lead-acid storage batteries. Thus, for example, apparatus for regulating the level of the electrolyte in electric storage batteries and for topping up with distilled water from a reservoir provided with a float-operated valve is described in German Utility Model Specification No. 7 440 002. When the surface of the electrolyte has reached a predetermined level, the supply of water is instantaneously interrupted by a conical valve. The floats used in practice have the largest possible volume in order to ensure reliable interruption of the water supply. The water-refilling device is generally connected to the reservoir by a system of rigid pipe lines.

In apparatus of this type, the control of the temperature and concentration of the electrolyte involves considerable expenditure, since direct access to the electrolyte through the plug hole is largely blocked by pipe lines and floats.

DISCLOSURE OF THE INVENTION

It is thus an object of the invention to facilitate control of the temperature and concentration of the electrolyte by simple means despite the presence of rigid water pipes and large float valves of the water-filling device.

The problem is solved by providing the container cover of the storage battery with a separate, tightly sealable diagnostic aperture adjacent the water-refilling hole.

The diagnostic aperture is closed by an automatically sealing plug, the shaft of which is provided with concentric circumferential integral packing washers or sealing lips. The plug is made preferably of an inherently flexible material, for example polyethylene.

The plug may, however, also be provided with a radio transmitter by which data about the state of the electrolyte are transmitted to the outside.

An embodiment of the invention is hereinafter described, by way of example, with reference to the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

Figure 1 is a plan view showing part of an assembly of multi-cell lead-acid storage batteries together with their water-refilling devices;

Figure 2 is a section along the Line A-B of Figure 1; and

Figure 3 is a side elevational view of a sealing plug and a cross-sectional view of the diagnostic aperture sealed by the plug.

BEST MODE FOR CARRYING OUT THE INVENTION

Referring to Figure 1, lead-acid batteries 1 contained in a trough (not shown) are electrically interconnected by terminals 2 and connecting cables 3. Each battery comprises three cells, each of which is provided with a water-refilling device 4 mounted in the conventional plug hole 15 provided in the battery cover 16. The water-refilling devices 4 are connected to a reservoir (not shown) by a common conduit 5. A gas vent pipe 6, through which the gases formed in the cells are removed to the outside, may optionally be provided adjacent the water conduit 5. The gases may be fed, for example, to a central recombination reactor. Diagnostic apertures 7 adapted to be sealed, so as to be gas and liquid-tight, by means of plugs 8 are provided in the battery cover 16, adjacent each of the water-refilling devices 4.

The cross-sectional view of Figure 2 shows the water-refilling device 4 together with the plug 8. The water-refilling device 4 is connected to a reservoir by a connecting piece 9 and conduit 5. A connecting piece 10 and a conduit 6 serve for removal of the gases formed in the cell; the conduit 6 is connected to a central recombination reactor. The connections 9 and 10 are T-shaped.

Each diagnostic aperture 7 is sealed by a plug 8 the stem of which is provided with flexible integral circumferential packing washers or lips 11. The lower portion of the shaft is provided with a snap-locking edge 12 formed by a circumferential packing washer of a larger diameter. The plug 8 is preferably made of inherently flexible material, for example, of polyethylene, its shaft diameter, excluding the washers or lips 11, amounting to from 6 to 12 mm, preferably about 8 mm, the diameter across the washers or lips being approximately 4 mm greater.

Each actual water-refilling device 4 consists of a top part 13 containing a conical valve (not shown). The valve cone is mechanically connected to a float 14. The float 14 is so dimensioned as to ensure that the valve cone applies an adequate contact pressure when the electrolyte has reached a determined level.

The diagnostic aperture 7 provided in the cover 16 consists a simple means of checking the electrolyte, for example the density of the electrolyte, without it being necessary for the water-refilling system to be dismantled.

Without necessarily limiting the scope of the invention claimed, preferred embodiments of the invention may be summarised as follows:—

1. An electric storage battery, in which the plug hole in the cover is provided with a built-in water-refilling device, characterised in that a separate, tightly sealable diagnotic aperture (7) is provided adjacent the plug hole in the cover of the battery.

2. An electric storage battery according to Summary 1, characterised in that the diagnostic aperture (7) is sealed by an automatic sealing plug (8) the shaft of which is provided with circumferential, flexible packing washers (11).

3. An electric storage battery according to Summary 2, characterised in that the plug is made of a flexible material, preferably polyethylene.

4. An electric storage battery according to Summary 1, characterised in that the water-refilling device comprises a float (14) by which a conical valve is controlled.

Although reference numerals have been used in the appended claims to improve the intelligibility of

these claims, it is expressly stated that these reference numerals should not be construed as limiting the claims to the constructions illustrated in the accompanying drawings.

CLAIMS

1. An electric storage battery (1) having a built-in water-refilling device (4) situated in a conventional plug hole (15) of the battery cover (16), characterised in that a separate, tightly sealable diagnostic aperture (7) is provided in the battery cover (16) adjacent the plug hole (15).

2. A battery (1), according to Claim 1, characterised in that the diagnostic aperture (7) is tightly sealed by a sealing plug (8) having flexible integral packing washers or lips (11) provided on the plug stem.

3. A battery (1), according to Claim 2, characterised in that the plug (8) is made of an inherently flexible material.

4. A battery (1), according to Claim 3, characterised in that the flexible material is polyethylene.

5. A battery (1), according to any preceding claim, characterised in that the water-filling device (4) comprises a float (14) and a conical valve controlled by the float.

6. A battery (1), according to any one of Claims 2 to 5, characterised in that the plug (8) includes a radio transmitter for transmitting diagnostic information.

7. A battery (1), according to any preceding claim, characterised in that it is a lead-acid battery (1).

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